

## Oxidation and Sulfidation Resistant Materials



### Project Lead

Albany Research Center  
Albany, OR

### Description

The overall goal of this research program is to develop stainless steels with performance characteristics necessary for process streams in advanced heat recovery and hot gas cleanup systems employed with advanced power generation systems (IGCC, PFBC and IGFC). Using basic alloy design principles a baseline composition of Fe-16Cr-16Ni-2Mn-1Mo was selected, to which a total of 5 % weight Si and Al additions can be made and retain a fully austenitic microstructure. Research to date has shown significant improvements in the oxidation resistance of alloys with Si additions in the target temperature range of 700°C to 800°C (i.e., during cyclic oxidation tests at 800°C for 1000 hrs, alloys with Si additions possessed weight gains 4 times less than the type 304 alloy). The current research program aim is to understand the basic mechanisms by which Si improves the oxidation resistance and to assess the preliminary resistance of these alloys to sulfidizing environments. In order to improve the high temperature creep resistance, conventional strengthening studies involving Ta, Nb, V and Ti carbides together with additions of boron and tungsten are also being conducted on these Si modified alloys. In a parallel effort, a series of thermomechanical treatments is being utilized to obtain a fine dispersion of TiC precipitates in 9Cr/Cu/Co ferritic steels to improve creep resistance. The objective of this effort is to develop a ferritic steel to be used in the 600°C - 700°C range.

### Product Support Areas

Gasification Technologies	Combustion Technologies	Sequestration	Environmental & Water Resources	Advanced Turbine & Engines	Fuel Cells
					



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